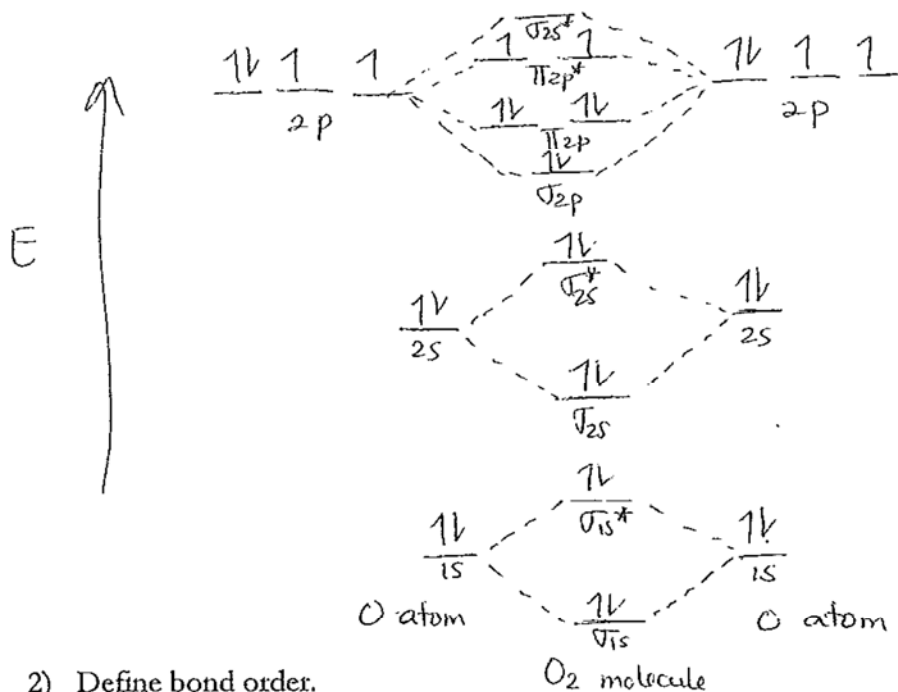


Chemistry 129
Molecular Orbital Theory

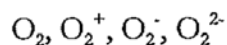
- 1) Draw a molecular orbital diagram for O_2 .



- 2) Define bond order.

$$B.O. = \frac{1}{2} (\# \text{ bonding } e^- - \# \text{ antibonding } e^-)$$

- 3) Using the molecular orbital diagram above, determine the bond order for the following species:



Assign the bond length and bond energy from the tables below to each molecule.

Molecule	bond order	bond energy	bond length
O_2	2	494 kJ/mol	121 ppm
O_2^+	2.5	643 kJ/mol	112 ppm
O_2^-	1.5	395 kJ/mol	133 ppm
O_2^{2-}	1	250 kJ/mol	149 ppm

Bond energies

494 kJ/mol
250 kJ/mol
643 kJ/mol
395 kJ/mol

Bond lengths

149 pm
133 pm
112 pm
121 pm